Please amend the specification as indicated below. A marked up version of the amended paragraphs are attached to this response.

Delete the duplicate reference to the parent application added before line 1 on page 1 of the specification by the Preliminary Amendment of 16 November 1998.

Delete the first paragraph on page 10 of the specification and replace with the following paragraph:

D1

The carbon dioxide and the carbon monoxide remain in equilibrium at elevated temperatures according to the shift gas reaction:

$$CO + H_2O \Leftrightarrow CO_2 + H_2 \qquad (5)$$

Delete the second full paragraph on page 11 of the specification and replace with the following paragraph:

D2

Referring now to FIG. 4, the process chamber is within the combustion chamber conduits which define combustion chambers 1, and the conduits defining the combustion chambers 1 are within a larger conduit, the fuel flowing inside of the larger conduit and outside of the conduits that define the oxidation chambers. Fuel nozzles 6 are located in the conduits separating the fuel from the oxidation chambers, with the fuel flowing through the nozzles into the oxidation chambers. The advantage of this configuration is that only one large conduit is required for fuel flow.

Delete the paragraph bridging pages 11 and 12 and replace with the following paragraph:

D3

Referring now to FIG. 7, an arrangement similar to FIG. 5 is shown with an additional feature that the combustion chamber flow is split, with the inlet to the oxidation chamber 1 being near the center of the length of the oxidation chamber 1. Flow

from the inlet splits into a flow going in each direction. This split oxidation chamber permits longer process chamber flowpath for the distance of the combustion chamber flowpath, and reduces the flow in the oxidation chamber by half. Thus, the pressure drop is reduced by a factor of about eight for similar dimensions for the combustion flowpath. This can be beneficial because of the importance of compression costs in the economics of the process. This alternative may be desirable where it is desirable to have a relatively long straight flowpath for the process. As another alternative, the fuel conduit may be outside of the oxidation chamber as in FIG. 6.

D3end

Delete the first full paragraph on page 7 and replace with:

A process chamber 8 is in heat exchange relationship to the oxidation reaction chamber 1. A process stream enters the process chamber at the inlet 11 and exits at an outlet 12. A quench heat exchanger 10 is shown to cool the process stream exiting the process chamber. The quenched (cooled) process stream exits the quench heat exchanger at outlet 15. A stream to be heated by the quench heat exchanger enters at quench inlet 14 and exits through quench outlet 13. The stream to be heated by the quench heat exchanger may be, for example, a process inlet stream, a boiler feed water stream that is heated and/or vaporized. In some processes, such as pyrolysis of hydrocarbons to produce olefins, rapid quench is desirable to reduce reactions to byproducts.

D4

In the Claims:

D5

1. (Twice amended) A process heater comprising:

an oxidation chamber, the oxidation chamber having an inlet for an oxidant, an outlet for combustion products, and a flow path between the inlet and the outlet;

a fuel conduit for transporting a fuel to the oxidation chamber, the fuel conduit containing a plurality of fuel nozzles along the length of the oxidation chamber, each nozzle providing fluid communication from within the fuel conduit to the oxidation chamber, the fuel nozzles being spaced so that fuel is added to the oxidation chamber at a rate that no flame results when the fuel is mixed with the oxidant flowing through the flow path in the oxidation chamber;

a preheater in fluid communication with the oxidation chamber inlet, the preheater capable of increasing the temperature of the oxidant to a temperature resulting in the oxidant and fuel when mixed in the oxidation chamber being hotter than the autoignition temperature of said mixture of oxidant and fuel; and

D5 end

a process chamber in a heat exchange relationship with the oxidation chamber whereby a controllable heat flux is provided to the process chamber, and the heat transferred from the oxidation chamber to the process chamber does not cause the temperature of the mixture of oxidant and fuel within the oxidation chamber to decrease below the autoignition temperature of said mixture of oxidant and fuel in the oxidation chamber.

2. (Twice amended) The process heater of claim 1 further comprising a coke inhibitor injection system, the coke inhibitor injection system being in fluid communication with the fuel conduit wherein an amount of coke inhibitor is supplied effective to inhibit coke formation at fuel conduit operating temperatures.

D6

3. (Amended) The process heater of claim 1 wherein the fuel conduit is a tubular conduit essentially centrally located within the oxidation chamber.

4. (Amended) The process heater of claim 3 wherein the oxidation chamber is essentially centrally located within the process chamber.

5. (Amended) The process heater of claim 1 wherein the process chamber is a pyrolysis reaction chamber for the thermal cracking of hydrocarbons in the production of olefins.

D6 end

6. (Amended) The process heater of claim 1 wherein the process chamber contains a catalyst and is used for steam methane reforming.

7. (Amended) The process heater of claim1 wherein the process chamber contains catalyst and is used for the production of styrene by the dehydrogenation of ethyl benzene.

13. (Amended) The process heater of claim1 wherein the process chamber is used for an endothermic chemical reaction. (Amended)

D7

14. (Amended) The process heater of claim1 wherein the process chamber is used for the vacuum flash distillation of a feed.

15. (Amended) The process heater of claim 1 wherein the process chamber is a hydrocarbon distillation column reboiler.

16. (New) The process heater of claim 13 wherein the endothermic chemical reaction is conducted in a single stage, and heat is provided to the process chamber by the oxidation chamber at a controlled temperature profile.

D8

17. (New) The process heater of claim 1 wherein the oxidant is preheated by heat exchange with effluent from the process chamber.

18. (New) A flameless distributed combustion process heater comprising:

an oxidation chamber, said oxidation chamber having an inlet for oxidant and an outlet for combustion products, and a flow path between said inlet and outlet;

a fuel conduit for transporting fuel into said oxidation chamber, said fuel conduit containing a plurality of fuel nozzles distributed along the length of said oxidation chamber, said fuel nozzles being spaced so that the flow of fuel through said fuel nozzles results in no flame when the fuel passes through the nozzles and is mixed with oxidant flowing through said flow path in said oxidation chamber;

a preheater in fluid communication with said oxidation chamber, for preheating said oxidant to above a temperature at which when said oxidant and fuel are mixed in said oxidation chamber, the temperature of said mixture of oxidant and fuel exceeds the autoignition temperature of said mixture; and

D8 cont

a process chamber in heat exchange relationship with said oxidation chamber, said plurality of nozzles distributed along the length of said oxidation chamber being sized to provide the desired temperature distribution within said process chamber.

19. (New) The flameless distributed combustion process heater of claim 18 wherein the process conducted in said process chamber is an endothermic chemical reaction.

20. (New) The flameless distributed combustion process heater of claim 18 wherein the process chamber is a pyrolysis reaction chamber for the thermal cracking of hydrocarbons in the production of olefins.

21. (New) The flameless distributed combustion process heater of claim 19 wherein said endothermic chemical reaction is conducted in a single reaction stage at a controlled temperature profile.